A PASSION FOR PERFECTION

PFEIFFER VACUUM

# HiCube 80 Eco

**Turbo pumping station**

# Operating Instructions

EN

Translation of the original instructions

PT 0263 BEN/D (1108)

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# 1 About this manual

## 1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refer to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from www.pfeiffer-vacuum.com.

### Applicable documents

| HiCube 80 Eco | Operating instructions |
|---|---|
| Declaration of Conformity | Part of this document |
| Operating instructions for components | see product description* |

*also available via www.pfeiffer-vacuum.net

For information about other certifications, if applicable, please see the signet on the product or:

- www.tuvdotcom.com
- TUVdotCOM-ID 0000021320

## 1.2 Conventions

### Safety instructions

The safety instructions in Pfeiffer Vacuum operating manuals are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, SEMI S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

**DANGER**

**Immediate danger**

Death or very severe injuries can occur.

**WARNING**

**Possible danger**

Injuries or severe property damages can occur.

**CAUTION**

**Possible danger**

Injuries or property damages can occur.

**NOTE**

**Command or note**

Command to perform an action or information about properties, the disregarding of which may result in damage to the product.

## Pictograph definitions

Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents.

Warning of a displayed source of danger in connection with operation of the unit or equipment.

Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents.

## Instructions in the text

➔ Work instruction: here you have to do something.

## Abbreviations used

**DCU:** Display and operating unit
**HPU:** Handheld programming unit
**TC:** Electronic drive unit for turbopump
**TPS:** Mains pack

## Symbols used

The following symbels are used consistently throughout the diagrams:

- High vacuum flange
- Fore-vacuum connection
- Electric connection
- Air cooling unit
- Venting connection
- Sealing gas connection
- Exhaust connection

# 2 Safety

## 2.1 Safety precautions

**NOTE**

**Duty to inform**

Each person involved in the installation, operation or maintenance of the vacuum pump must read and observe the safety-related parts of these operating instructions.

➔ The operator is obligated to make operating personnel aware of dangers originating from the vacuum pump, the pumped medium and the entire system.

**NOTE**

**Installation and operation of accessories**

Pfeiffer Vacuum pumps can be equipped with a series of adapted accessories. The installation, operation and maintenance of connected devices are described in detail in the operating instructions of the individual components.

➔ For information on order numbers of components, see "Accessories".

➔ Use original accessory parts only.

**NOTE**

**Checking the safety system against excess rotation speed**

To provide the functioning of the integrated safety system for avoiding excess rotation speed, the pump must run-up from the standstill at least once a year.

➔ Switch off the pump and await the complete standstill (rotation speed = 0 Hz).

➔ Run-up the pump according to this operating instructions.

**WARNING**

**Danger - Electrical installation**

Safe operation after installation is the responsibility of the operator.

➔ Do not independently modify or change the pump and electrical equipment.

➔ Make sure that the system is integrated in an emergency off safety circuit.

➔ Consult Pfeiffer Vacuum for special requirements.

**WARNING**

**Danger of electric shock**

In case of defect, the parts connected to the mains supply are under voltage.

➔ Always keep the mains connection freely accessible so you can disconnect it at any time.

- Do not expose any body parts to the vacuum.
- Observe all safety and accident prevention regulations.
- Regularly check the proper observance off all safety measures.
- Always ensure a safe connection to the protective earthing conductor (PE, protection class I).
- Do not loosen any plug connection during operations.
- Wait for the rotor to reach standstill before peforming work on the high vacuum flange.
- Keep leads and cables well away from hot surfaces (> 70 °C).
- Never fill or operate turbopump with cleaning agent.
- Do not operate the turbopump with open high vacuum flange.
- Do not carry out any unauthorised modifications or conversions to the pumps.

- The unit has been accredited with protection class IP 20. When installing into ambient conditions, which afford other protection classes, the necessary measures must be taken.
- Note the shipping instructions, when returning the unit.

## 2.2 Protective equipment

Determined situations concerning the handling of vacuum pumps require wearing of personal protective equipment. The owner, respectively the employer are obligated to provide adequate equipment to any operating persons.

**DANGER**

**Danger to health by hazardous substances during maintenance or installation**

Depending on the process vacuum pumps, components or operating fluids can be contaminated by toxic, reactive or radioactive substances.

➔ Wear adequate protective equipment during maintenance and repairs or in case of reinstallation.

**WARNING**

**Risk of injury through falling objects**

When transporting vacuum pumps by hand, there is a danger through loads slipping and falling down.

➔ Carry small and mid-size vacuum pumps two-handed.
➔ Carry vacuum pumps > 20 kg by a suitable lifting device.
➔ Wear safety shoes with steel toe cap according to directive EN 347.

**CAUTION**

**Risk of injury through hot surfaces**

Vacuum pumps can become hot during operation.

➔ Allow the pump to cool before maintenance and repairs.
➔ If necessary wear protective gloves according to directive EN 420.

**CAUTION**

**Risk of injury through sharp edges**

Rotor and stator disks of turbopumps have very sharp edges.

➔ Before any working wait for the complete standstill of the pump.
➔ Do not reach in the high vacuum flange.
➔ If necessary wear protective gloves according directive EN 420.

## 2.3 Proper use

**NOTE**

**CE conformity**

The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.

➔ Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.

- Only use the pumping station for creating vacuum.
- Only operate the pumping station as an entire unit.
- Only use the pumping station for evacuation of dry and inert gases; other applications only after consultation with Pfeiffer Vacuum.

## 2.4 Improper use

Improper use will cause all claims for liability and warranties to be forfeited. Improper use is deemed to be all use for purposes deviating from those mentioned above, especially:

- Pumping of corrosive or explosive media.
- Pumping of condensing vapors.
- Pumping of liquids.
- Pumping of dusts.
- Operation with improper high gas throughput.
- Operation with improper high fore-vacuum pressures.
- Operation with improper gas mode.
- Operation with improper high levels of insulated heat input.
- Venting with improper high venting rates.
- Use of the pumping station to generate pressure.
- The operation of the devices in potentially radioactive areas.
- The operation of the devices in systems where the turbopumps are subjected to impact-like stress and vibrations or the effect of periodically occurring forces.
- The connection to a power supply with earthing of a direct voltage pole.
- The use of accessories or spare parts, which are not named in this manual.

**NOTE**

**Closure seal**

The product is sealed at the factory. Damaging or removal of a closure seal leads to the loss of liability and warranty entitlements.

➔ Do not open the product within its warranty period!

➔ For process-related shorter maintenance intervals please contact the Pfeiffer Vacuum Service.

# 3 Transport and storage

## 3.1 Transport

➔ Only transport the pumping station by hand.
➔ Always transport the pumping station uprightly and as even as possible.
➔ Keep the original protective covers.

## 3.2 Transportation lock

The backing pump of the pumping station HiCube 80 Eco is secured against damage during transport *(see p. 15, chap. 5.6)*.

➔ Follow instructions concerning the installation location!
➔ Before putting into operation loosen the backing pump's transportation lock device at the installation location.

## 3.3 Storage

➔ Close the flange openings by using the original protective covers.
➔ Close further connection ports by using the corresponding protective covers.
➔ Only store the pumping station indoors at an ambient temperature between + 5 °C and +40 °C.
➔ In rooms with moist or aggressive atmospheres, the pumping station must be airproof shrink-wrapped in a plastic bag together with a bag of dessicant.

# 4 Product description

## 4.1 Product identification

### Product features

| Feature | HiCube 80 Eco | | | Operating instructions |
|---|---|---|---|---|
| High vacuum flange | DN 63 ISO-K | DN 63 CF | DN 40 ISO-KF | |
| Flange material | Aluminium | Stainless steel | Aluminium | |
| Turbopump | HiPace 80 | HiPace 80 | HiPace 80 | PT 0208 BN |
| Electronic drive unit | TC 110 | TC 110 | TC 110 | PT 0204 BN |
| Backig pump | MVP 015-2 | MVP 015-2 | MVP 015-2 | PU 0012 BN |
| Power supply pack | TPS 110 | TPS 110 | TPS 110 | PT 0199 BN |
| Display and control unit (option) | DCU 002 | DCU 002 | DCU 002 | PT 0250 BN |
| Accessories | Air cooling unit | Air cooling unit | Air cooling unit | PT 0231 BN |
| Order number **without** display and control unit | PM S03 550 | PM S03 551 | PM S03 552 | |
| Order number **with** display and control unit | PM S03 555 | PM S03 556 | PM S03 557 | |

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available.

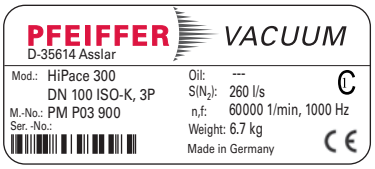



**Fig. 1: Example for a rating plate**

### Scope of delivery

- HiCube 80 Eco
- Protective cover for the high vacuum flange
- Connection cable M12, 3 m length
- Operating manuals for pumping station and individual components

## 4.2 Function

Turbo pumping stations are fully automatic pump units which are ready for connection. A turbo pumping station consists of a portable or mobile vacuum pumping unit with a turbopump and a specially matched backing pump.

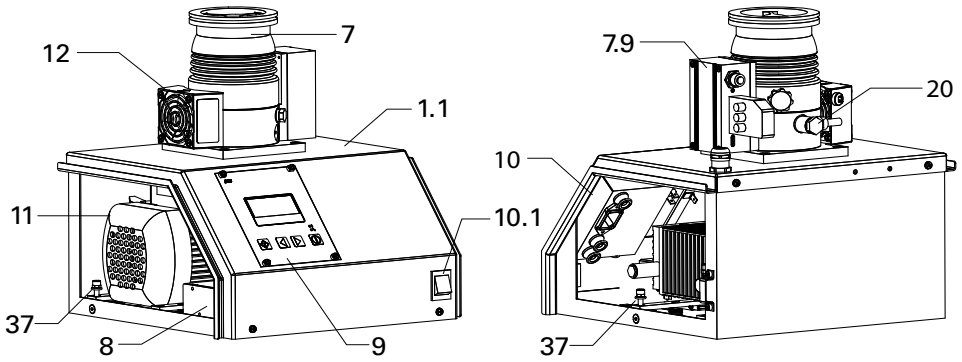



**Fig. 2: Views of HiCube 80 Eco**

| | | | | | |
|---|---|---|---|---|---|
| 1.1 | Casing | 9 | Display and control unit DCU 002 (option) | 12 | Air cooling unit |
| 7 | Turbopump HiPace 80 | | | 20 | Fore-vacuum connecton |
| 7.9 | Electronic drive unit TC 110 | 10 | Relay box | 37 | Hexagon nut, transportation lock |
| 8 | Power supply pack TPS 110 | 10.1 | Main switch | | |
| | | 11 | Backing pump MVP 015-2 | | |

The turbo pumping station HiCube 80 Eco is available with or without a display and control unit. The display and control unit DCU 002 is used to control and monitor the pumping station. The DCU can be detached from the pumping station and used together with an connection cable M12 (accessory) as a remote control.

**Cooling**

- Air cooling
- Water cooling (optional)

In the case of excess temperature the electronic drive unit reduces the drive power automatically.

**Drive**

Electronic drive unit of the turbopump

## 4.3 Range of application

The pumping station HiCube 80 Eco must be installed and operated in the following ambient conditions.

| | |
|---|---|
| Installation location | weather protected (indoors) |
| Protection category | IP 20 |
| Protection class | I |
| Temperature | +5 °C to +30 °C with convection cooling without gas throughput<br>+5 °C to +35 °C with air cooling<br>+5 °C to +40 °C with water cooling |
| Relative humidity | max. 80 %, at T ≤ 31 °C, up to max. 50% at T ≤ 40 °C |
| Atmospheric pressure | 75 kPa - 106 kPa |
| Installation altitude | 2000 m max. |
| Degree of pollution | 2 |
| Permissible surr. magnetic field | ≤3 mT |
| Overvoltage category | II |
| Connection voltage TC | 24 VDC ±5% |

# 5 Installation

## 5.1 Set-up

The installation location is to be chosen so that components that need servicing are freely accessible at all times. No special foundations or base are necessary for installation. The unit must not be used outdoors. Conditions are:

- The ambient conditions specified for the area of use.
- a level, vibration-free surface.
- Distance to side walls or adjacent devices: at least 50 cm.
- Distance to possible edges of tables: at least 10 cm.
- When using a casing heating and a water cooling unit the temperature of the connected flange of the vacuum chamber must not exceed 120 °C.
- It is not allowed to operate the device in systems where impact-like stresses and vibrations or periodically forces occur.

## 5.2 Preparatory work

➔ Ensure sufficient cooling for the pumping station.

➔ Where magnetic fields > 3 mT are involved, a suitable shielding must be used. Check installation location and consult Pfeiffer Vacuum if needed!

➔ The maximum permissible rotor temperature for the turbopump is 90 °C. If high temperatures arise for process reasons, the radiated heat input must not exceed 3 W. Install suitable screening sheets, if necessary (design information on request).

## 5.3 Connecting the high vacuum side

The assembly of superstructure on the pumping station HiCube 80 Eco is in the operator's responsibility. The load capacity of the high vacuum flange is specific for the used turbopump. The gross weight of superstructure on the pumping station HiCube 80 Eco may **not** exceed 50 kg!

➔ Observe barycentric shifting by using high or lateral protruding superstructure (e.g. vacuum chamber). **Danger of tilting!**

➔ Install the high vacuum flange in accordance with the instructions in the operating manual of the turbopump.

➔ Ensure the greatest possible cleanliness when installing any high vacuum parts. Unclean components prolong the pump-down time.

In the case the rotor suddenly blocks, the torques arising from the system and the high vacuum flange must be absorbed. Only the components listed in the following can be used to fasten the turbopumps to the high vacuum flange. The components for installing the turbopumps are special designs of Pfeiffer Vacuum. Observe the minimum strength of 170 N/mm$^2$ for the flange material.

**NOTE**

**Observe shape tolerances for the counter flange!**

Unevennesses of the customer supplied counter flange can lead to warping of the pump casing despite proper fastening. Leakiness and negative running characteristics can be the result.

➔ Do not exceed an evenness of max. 0.05 mm for the whole surface.

**NOTE**

**Mounting of ISO flanges**

If the rotor suddenly blocks the connection of high vacuum flanges of types ISO-KF or ISO-K can lead to twisting despite proper installation.

- The tightness of the high vacuum flange is not at risk thereby.

## Use of a splinter shield or protection screen

The installation of a Pfeiffer Vacuum centering ring with splinter shield or protection screen in the high vacuum flange protects the turbopump against foreign bodies coming from the chamber. The volume flow rate is reduced.

| | Reduced volume flow rate in % | | | |
|---|---|---|---|---|
| | $H_2$ | He | $N_2$ | Ar |
| Splinter shield DN 40 | 6 | 9 | 17 | 18 |
| Splinter shield DN 63 | 3 | 6 | 15 | 16 |
| Protection screen DN 63 | 1 | 1 | 4 | 4 |

## Vibration damper

**DANGER**

**Danger from the turbopump and vibration dumper being torn-off**

In case of sudden blocking of the rotor, an applied vibration dumper cannot compensate any of the occurring forces. There is a danger of the turbopump being torn-off and thereby resulting severest injuries and property damages. Applicable safeguards must be taken to compensate possible occurring torques.

➔ Definetely consult with Pfeiffer Vacuum.

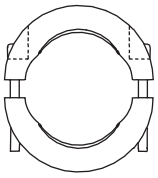
➔ Do not exceed the max. permissible temperature at the vibration dumper (100° C).

## Installation of

### ISO-KF flange with ISO-KF flange

For the installation of the flange connections the following components are available:

- The valid mounting kit of the Pfeiffer Vacuum accessories programme.
- A protection screen or splinter shield can optionally be used.



➔ Mind that the sealing surfaces are not damaged.

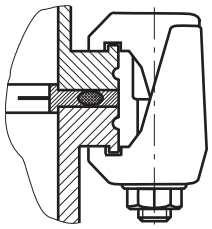
➔ Flange the turbopump with the clamping ring.

➔ Tightening torque: 3,7 Nm.

### Installation of ISO-K flange with ISO-K flange

For the installation of the flange connections the following components are available:

- The valid mounting kit of the Pfeiffer Vacuum accessories programme.
- A protection screen or splinter shield can optionally be used.



➔ Mind that the sealing surfaces are not damaged.

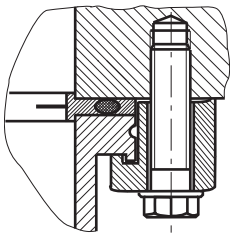
➔ Connect the flanges according to the drawing and with the component parts of the mounting kit.

➔ Use the required number of **4** claw clamps.

➔ Tighten the claw clamps crosswise in three steps.

➔ Tightening torque: 5, 15, 25 ±2 Nm

## Installation of ISO-K flange with ISO-F flange



For the installation of the flange connections the following components are available:

- The valid mounting kit of the Pfeiffer Vacuum accessories programme.
- A protection screen or splinter shield can optionally be used.

➔ Mind that the sealing surfaces are not damaged.
➔ Connect the flanges according to the drawing and with the component parts of the mounting kit.
➔ Use the required number of **4** claw grips.
➔ Tighten the claw grips crosswise in three steps.
➔ Tightening torque: 3, 10, 16 ±1 Nm.

## Installation of CF-flanges

**NOTE**

**Preservation of sealing capacity**

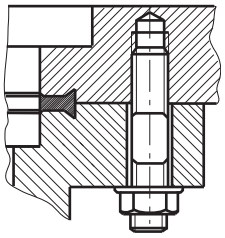
Observe the following to preserve sealing capacity:

➔ Touch seals only with gloves.
➔ Make sure sealing lips are undamaged.

The connection types for installation of CF to CF flange are "stud screw and blind hole" as well as "hex screw and through hole". The following elements are required:

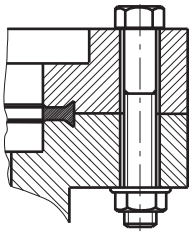
- The valid mounting kit of the Pfeiffer Vacuum accessories programme.
- A copper seal
- A protection screen or splinter shield can optionally be used.

### Stud screw and blind hole



➔ If used: Insert protective screen or splinter shield with the clamping lugs downward into the high vacuum flange of the turbopump.
➔ Place the seal exactly in the hollow.
➔ Connect the flange using **8** stud screws (M8) with washers and nuts and tighten circularly with a torque of 22 ±2 Nm. After this, check the torque, since flowing of the sealing material may make it necessary to tighten the screws.

### Hexagon screw and through hole



➔ If used: Insert protective screen or splinter shield with the clamping lugs downward into the high vacuum flange of the turbopump.
➔ Place the seal exactly in the hollow.
➔ Connect the flange using **8** hex screws (M8) with washers and nuts and tighten circularly with a torque of 22 ±2 Nm. After this, check the torque, since flowing of the sealing material may make it necessary to tighten the screws.

## 5.4 Connecting the exhaust side

**CAUTION**

**High pressure in the exhaust line!**

Danger of damage to the seals and danger of the pump bursting.

➔ Install the line without shut-off valves on the exhaust side.

➔ Pumpe nicht mit Überdruck am Einlass betreiben; max. zulässige Drücke und Druckdifferenzen beachten.

➔ Choose the cross-section of the exhaust line to be at least the size of the nominal connection diameter of the vacuum pump's exhaust connection.

➔ Piping to the pump must be suspended or supported.

– Physical forces from the piping system must not be allowed to act on vacuum pumps.

➔ Lay piping from the pump sloping downward so that no condensate can flow back into the pump; otherwise fit a condensate separator.

– If an air trap is created in the system, then a device for draining condensation water must be provided at the lowest point.

## 5.5 Connecting accessories

**NOTE**

**Installation and operation of accessories**

Pfeiffer Vacuum pumps can be equipped with a series of adapted accessories. The installation, operation and maintenance of connected devices are described in detail in the operating instructions of the individual components.

➔ For information on order numbers of components, see "Accessories".

➔ Use original accessory parts only.

**NOTE**

**Note the factory settings.**

The accessory connections on the turbopump have been preconfigured at the factory. Interchanging the control leads on the connector cause the pumping station to malfunction or fail.

➔ Do not interchange the control leads.

➔ Accessory connections can be configured for operation with the DCU.

– For more information refer to the operating instructions for the electronic drive unit of the turbopump.

**NOTE**

**Accessory connection on the TC 110**

The connection of Pfeiffer Vacuum accessory units to the electronic drive unit TC 110 is only possible by using respective connecting cables or rather adapters.

➔ Configurate the preferred accessory output via RS485 using a Pfeiffer Vacuum display and control unit or a PC.

➔ Consider the operating instructions "Electronic Drive Unit TC 110".

The pumping station is equipped with air cooling as a standard accessory.

## 5.6 Transportation lock

Turbo pumping stations of the HiCube 80 Eco line are equipped with a transportation lock for the backing pumps (see label). The backing pump is diagonally fixed with cylinder head screws with nuts via two spring loaded rails at the bottom plate of the pumping station.

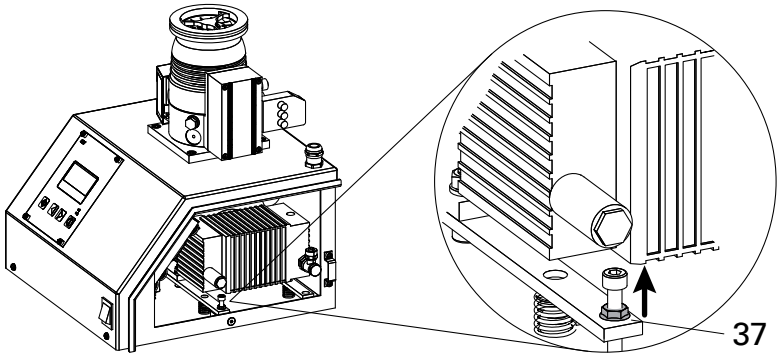
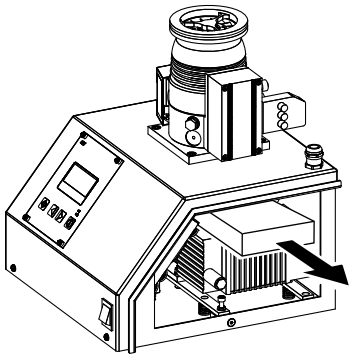



**Fig. 3: Transport protection for HiCube 80 Eco**

37 Transport protection

➔ Loosen the hexagon nut 37 of the transportation lock.

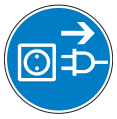
➔ Similarly loosen the transportation lock on the opposite side.



➔ Remove PE-foam padding above the backing pump from the casing.

## 5.7 Voltage range of the backing pump

The backing pump is driven by single-phase extended voltage range motors with reversible voltage ranges.



**NOTE**

**Overvoltage!**

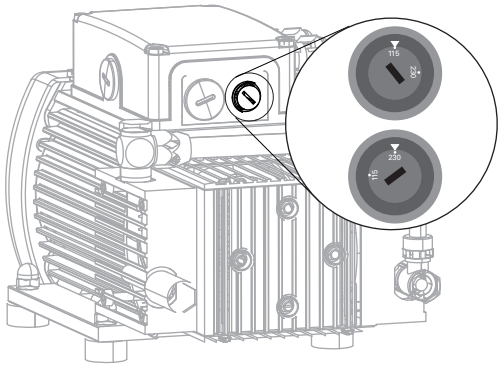
An incorrect voltage range setting can damage the motor.

➔ Always check the voltage range before switching on the pumping station.

➔ Disconnect the mains supply before changing the voltage range of the backing pump.

- 180 ... 254 V, 50/60 Hz
- 90 ... 126 V, 50/60 Hz

➔ Set the desired voltage range on the voltage selector switch using a suitable screwdriver.



| | | |
|---|---|---|
| Switch position: | "115" | "230" |
| Voltage ranges: | 90 ... 126 V; 50/60 Hz | 180 ... 254 V; 50/60 Hz |

**Fig. 4: Switch position for the voltage range at the backing pump**

## 5.8 Connecting to the mains power supply

**WARNING**

**Danger - Electrical installation**

Safe operation after installation is the responsibility of the operator.

➔ Do not independently modify or change the pump and electrical equipment.

➔ Make sure that the system is integrated in an emergency off safety circuit.

➔ Consult Pfeiffer Vacuum for special requirements.

**CAUTION**

**Automatic start**

After connecting the supply voltage and switching on the main switch, pumping stations **without** display and control unit will run up immediately.

➔ Switch the mains switch to position "0" before plugging in the mains cable.

➔ Switch on the mains supply immediately before operation.

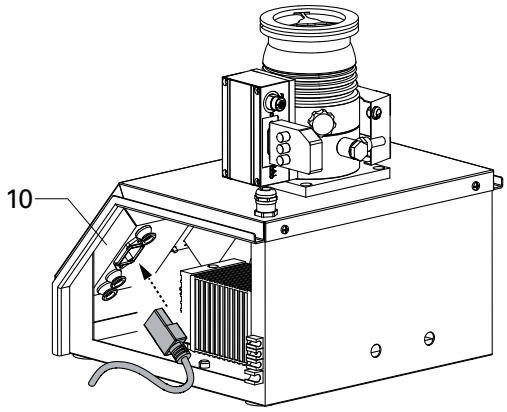



**Fig. 5: Connecting the mains supply**

10 Relay box

➔ Order the mains cable separately (see "accessories").

➔ Plug the mains cable into the the mains connection of the relay box.

➔ Connect the mains cable to the mains.

➔ Always ensure a safe connection to the protective earthing conductor (PE, protection class I).

# 6 Operation

## 6.1 Commissioning

The following important settings are programmed in the electronic drive unit ex factory.

- Parameter **[P:027]** Gas mode: 0 = heavy gases
- Parameter **[P:700]** Set value max. run-up time monitoring: 8 min
- Parameter **[P:701]** Rotation speed switchpoint: 80% of the nominal roation speed
- Parameter **[P:707]** Set value rotation speed setting mode: 65 % of the nominal rotation speed
- Parameter **[P:708]** Set value power consumption 60 % (may be only reduced)
- Parameter **[P:720]** Venting rotation speed at delayed venting: 50% of the nominal rotation speed
- Parameter **[P:721]** Venting time: 3600 s

➔ When water cooling is used: Open cooling water supply and check the flow.

➔ When sealing gas is used: Open the sealing gas supply and check the flow.

**NOTE**

**Comply run-up time**

Pump throughput can be impaired by condensate or remainig moisture in the fore-vacuum area. This can lead to exceeding the maximum run-up time.

➔ **Recommendation:** When switching on, open the gas ballast valve for about 5 min. *(see p. 19, chap. 6.4)*.

**CAUTION**

**Danger of the pump being destroyed**

Pumping of gases with a higher molecular mass in the wrong gas mode can lead to destruction of the pump.

➔ Ensure the gas mode is correctly set.

➔ Contact Pfeiffer Vacuum before using gases with a greater molecular mass (> 80).

## 6.2 Operation modes

The following operation modes are available:

- Operation without operating unit
- Operation via RS485 and Pfeiffer Vacuum display and control units or PC

## 6.3 Function description

**WARNING**

**Danger due to open high vacuum flange**

The rotor of the turbopump turns at high speed. If the high vacuum flange is open, there is a danger of cut injuries and that the pump can be destroyed by objects falling into it.

➔ Never operate the pump with an open high vacuum flange.

## Operation without operating unit

**CAUTION**

**Automatic start**

After connecting the supply voltage and switching on the main switch, pumping stations **without** display and control unit will run up immediately.

➔ Switch the mains switch to position "0" before plugging in the mains cable.

➔ Switch on the mains supply immediately before operation.

➔ Switch on the pumping station at the master switch.

After switching on the main switch, the electronic drive unit of the turbopump performs a self-test to check the supply voltage. Once the self test has been successfully completed, the turbopump and the backing pump begin to operate.

## Operation with DCU

➔ Consider the following manuals for the operation via Pfeiffer Vacuum display and control units:

- Operating instructions "DCU"
- Operating instructions "Electronic drive unit"

➔ Switch on the mains supply via the main switch.

➔ Switch on the pumping station via button "ON/OFF" on the DCU 002.

➔ Settings are possible via the RS485 by using DCU, HPU or PC.

### Use of the DCU as a remote control

The display and control unit can be removed from the pumping station and used as a remote control.

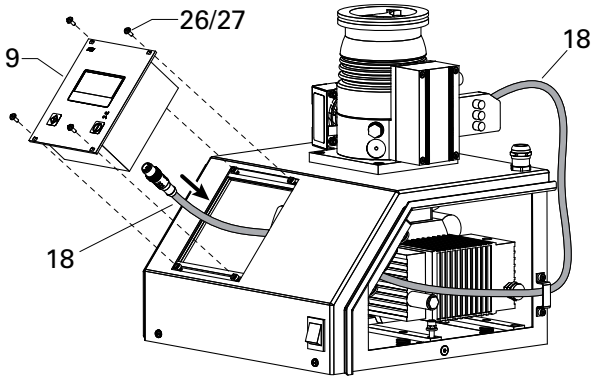



**Fig. 6: Setting up the DCU for use as a remote control**

| | | | |
|---|---|---|---|
| 9 | Display and control unit | 26 | Fixing screw |
| 18 | Connection cable TC-DCU | 27 | Washer |
| 19 | Connection cable M12 | PM 061 270 -X, Coupling M12 | |

➔ Switch off the pumping station at the master switch.

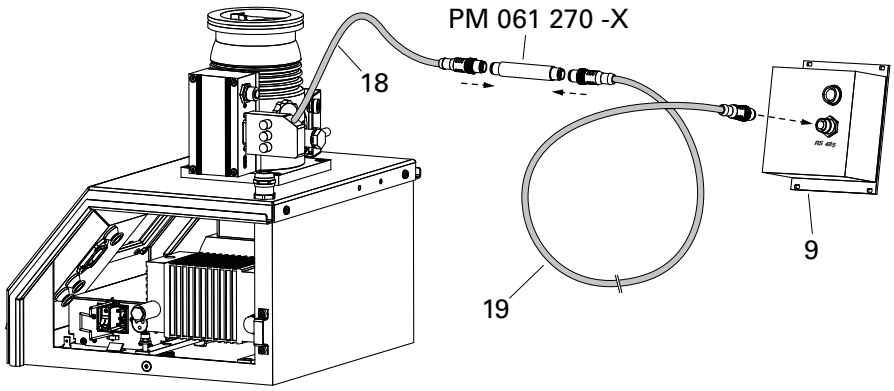
➔ Disconnect the mains plug.

➔ Unscrew and remove the 4 fastening screws with washers from the front panel of the display and control unit.

➔ Lift out the display and control unit from the casing.

– Be careful of the casing seal.

➔ Detach the connection cable from the DCU and remove from the pumping station frame.




➔ Attach the connetion cable 19 (delivery) as an extension with coupling PM 061 270 - X (accessory) to the connection RS485 of the display and control unit.

➔ **Option:** Swap the connecting cable 19 between the display and control unit and the electronic drive unit for a longer connection cable.

– Other lengths on request.

## 6.4 Operation with gas ballast valve

Steam or moisture from pumped media can condense in the backing pump and hence impair the suction performance.

Letting in gas ballast improves the discharge of condensate, and the pump achieves the specified final vacuum more quickly. The gas ballast valve can be replaced with a flushing gas connection if necessary.

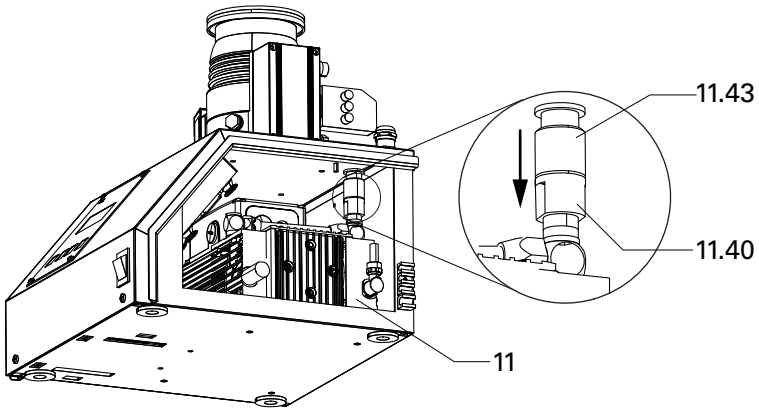



**Fig. 7: Gas ballast valve of the backing pump**

11 Backing pump MVP 015-2 11.40 Gas ballast valve 11.43 Sleeve

➔ Open gas ballast valve; for this push down the sleeve of the gas ballast valve.

## 6.5 Monitoring of the operation conditions

### Operating mode display via LED

LEDs in the front panel of the electronic drive unit show basic operating conditions of the turbopump. A differentiated malfunction and warning display is possible only for operation with DCU or HPU.

| LED | Symbol | Steady OFF | Flashing (1/12 s active) | Blinking (1/2 s active) | Steady ON |
|---|---|---|---|---|---|
| Green |  | insufficient power supply | Pumping station "OFF" Rotation speed ≤ 1Hz | Pumping station "OFF" Rotation speed > 1 Hz | Pumping station "ON" |
| Yellow | | no warning | | | Warning |
| Red | | no malfunction | | | Malfunction |

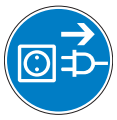
### Temperature monitoring

The drive power is reduced in case of impermissible motor temperature or impermissibly high housing temperature. This can cause falling below the rotation speed switchpoint and so result in turning off the turbopump.

## 6.6 Switching off and venting

### Switching off

After the turbopump is switched off, it must be vented to avoid contamination due to particles streaming back from the fore-vacuum area.



**WARNING**

**Risk of electric shock**

The pumping station is only free of voltages when the mains plug has been disconnected.

➔ Switch off the master switch and disconnect the mains plug before all work.
➔ Secure against unintentional restarting.

#### Switching off without the DCU

➔ Switch off the pumping station at the master switch.
➔ Venting (possibilities, see below)
➔ For water cooling: Shut off the water supply.

#### Switching off with the DCU

➔ Switch off the pumping station via the "ON/OFF" button on the DCU.
➔ Switch off the pumping station at the master switch.
➔ Venting (possibilities, see below)
➔ For water cooling: Shut off the water supply.

### Venting

#### Manually Venting

➔ Open the venting screw (included) in the venting connection of the turbopump about one turn.

#### Venting with Pfeiffer Vacuum Venting Valve

➔ Enable venting via the functions of the electronic drive unit.
➔ Settings are possible via the RS485 by using DCU, HPU or PC.

| Venting rotation speed | Switch off the pumping station | Mains power failure[1)] |
|---|---|---|
| 50% of the nominal rotation speed | Venting valve opens for 3600 s (1 h, works setting) | Venting valve opens for 3600 s (1 h, works setting) |

[1)] When mains power is restored the venting procedure is aborted.

#### Basic information for the rapid venting

Venting of the vacuum chamber in two steps. Ask for details on individual solutions from Pfeiffer Vacuum.

➔ Vent for 20 seconds at a rate of pressure rise of max. 15 mbar/s.
  – The valve cross section for the venting rate of 15 mbar/s must be adapted to the size of the vacuum chamber.
  – For small vacuum chambers, use the Pfeiffer Vacuum venting valve.
➔ Then vent with an additional venting valve of any desired size.

# 7 Maintenance / replacement

**WARNING**

**Contamination of parts and operating fluid by pumped media is possible.**

Poisoning hazard through contact with materials that damage health.

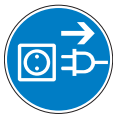
➔ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.

➔ Decontaminate affected parts before carrying out maintenance work.

**NOTE**

**Disclaimer of liability**

Pfeiffer Vacuum accepts no liability for personal injury or material damage, losses or operating malfunctions due to improperly performed maintenance. The liability and warranty entitlement expires.



**WARNING**

**Risk of electric shock**

The pumping station is only free of voltages when the mains plug has been disconnected.

➔ Switch off the master switch and disconnect the mains plug before all work.

➔ Secure against unintentional restarting.

## 7.1 Maintenance intervals and responsibilities

- Clean the pumping station externally with a lint-free cloth and little industrial alcohol.
- Carry out the required maintenance on the components of the pumping station in accordance with the instructions in the individual operating manuals.
- Clarify shorter maintenance intervals for extreme loads or impure processes with Pfeiffer Vacuum Service.
- For all other cleaning, maintenance or repair work, please contact your Pfeiffer Vacuum service location.

## 7.2 Removal of components for their maintenance

In some cases, components may need to be dismantled from the pumping station so that customers can carry out necessary maintenance work on them (they should then be reassembled in reverse order).

**CAUTION**

**Refer to the notes on Proper Use of the unit.**

The pumping station must only be operated as a complete unit. Disassembly and operation of individual pumping station components is deemed to be improper use.

- In this case the declaration of conformity will become invalid.

**Dismantling connections**

➔ Switch off the pumping station at the master switch.

➔ Disconnect the mains plug.

➔ Pull out the mains cable from the relay box.

➔ Pull out the mains supply cable (x2) for components from the relay box.

➔ Take off the connector from the electronic drive unit TC 110.

➔ Detach the accessory control lines from the connector and remove them.

**NOTE**

**Note the factory settings.**

The accessory connections on the turbopump have been preconfigured at the factory. Interchanging the control leads on the connector cause the pumping station to malfunction or fail.

➔ Do not interchange the control leads.

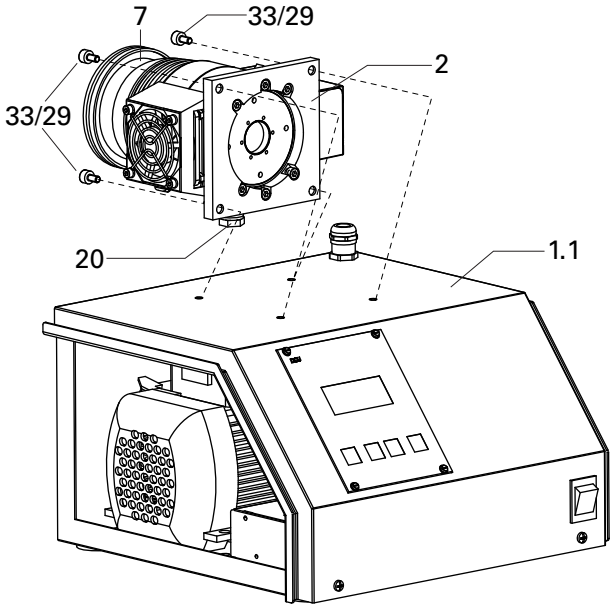
➔ Accessory connections can be configured for operation with the DCU.

– For more information refer to the operating instructions for the electronic drive unit of the turbopump.

| Connection to X3 | Preset accessory |
|---|---|
| *acc. A1* | Air cooling unit |
| *acc. B1* | Venting valve |
| *acc. DO1* | Backing pump |

**Overview of factory preconfigured accessory connections on the HiCube 80 Eco**

## Dismantling of the turbopump




1.1 Housing
2 Mounting plate
7 Turbopump
20 Fore-vacuum connection, elbow union
29 Spring washer
33 Allen head screw

**Fig. 8: Disassembly of the turbopump**

➔ Detach the fore-vacuum line from the turbopump and take it off.

– Do not kink or damage the fore-vacuum hose.

➔ Unscrew and remove all Allen head screws 95 (7x) from the mounting plate.

– Tightening torque for the fixing screws when mounted: 10 Nm

➔ Take off the turbopump with the mounting plate from the casing.

The opening in the mounting plate makes it easy for customers to perform maintenance work on the turbopumpturbopump (e.g. change the lubricant reservoir).

## Removing the backing pump

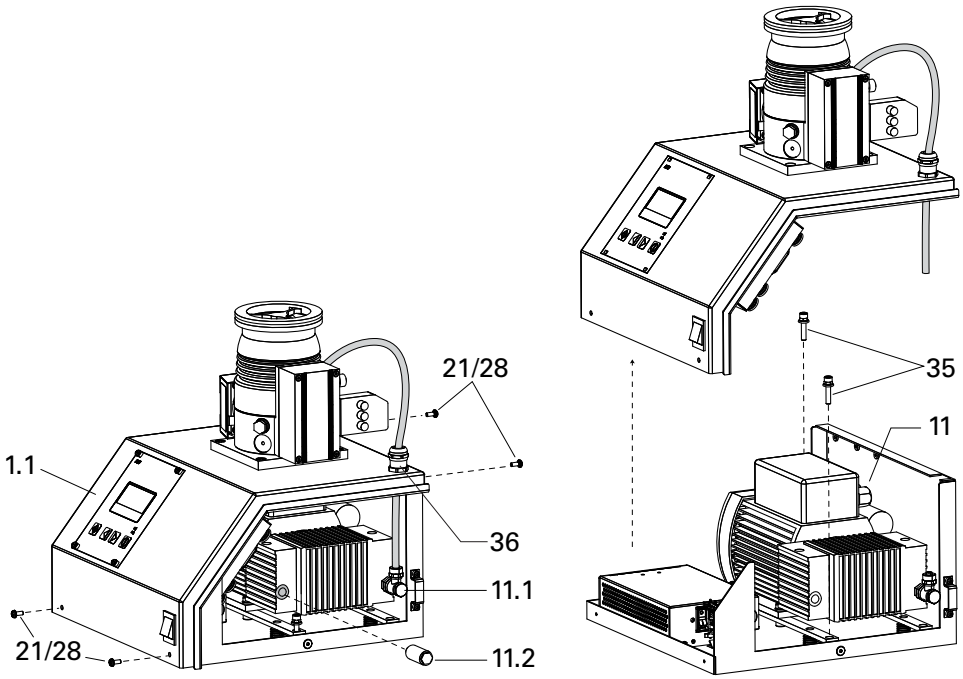



**Fig. 9: Disassembly of the diaphragm pump from the pumping stand frame**

| | | | | | |
|---|---|---|---|---|---|
| 1.1 | Casing | 11.2 | Exhaust silencer | 35 | Cylinder screw |
| 11 | Baking pump | 21 | Casing screw | 36 | Clamping screw |
| 11.1 | Vacuum connection backing pump | 28 | Washer | | |

➔ Detach the fore-vacuum line from the vacuum connection of the diaphragm pump and take it off.
  – Do not kink or damage the fore-vacuum hose.

➔ Unscrew and remove the casing screws and washers on the front and rear of the pumping stand frame.

➔ Take off the casing with turbopump, display and control unit and relay box from the pumping stand frame.
  – Observe the connection cables!

➔ Unscrew the exhaust silencer by hand from the backing pump.

➔ Unscrew the two cylinder screws 35 (allen head) from the bottom plate of the pumping station so that the backing pump is loosened.

➔ Lift out the backing pump above the top of the pumping station frame.

# 8 Decommissioning

## 8.1 Shutting down for longer periods

**WARNING**

**Contamination of parts and operating fluid by pumped media is possible.**

Poisoning hazard through contact with materials that damage health.

➔ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.

➔ Decontaminate affected parts before carrying out maintenance work.

If the pumping station should be shut down for longer than a year:

➔ Remove the pumping station from the system, if necessary.

➔ Change the operating fluid reservoir of the turbopump.

➔ Only store the pumping station indoors at an ambient temperature between + 5 °C and +40 °C.

➔ In rooms with moist or aggressive atmospheres, the pumping station must be airproof shrink-wrapped in a plastic bag together with a bag of dessicant.

## 8.2 Re-starting

**CAUTION**

**Re-starting**

The serviceability of the operating fluid of the turbopump without operation is a maximum of 4 years. Before restarting after a shut-down of **4 years or longer**, carry out the following work:

➔ Replace the operating fluid reservoir

➔ Replace bearings

➔ Follow the maintenance instructions and inform Pfeiffer Vacuum

➔ Check pumping station for contamination and moisture.

➔ Clean the pumping station externally with a lint-free cloth and little industrial alcohol.

➔ If necessary, have Pfeiffer Vacuum Service clean the pumping station completely.

➔ Installation and commissioning in accordance with the operating instructions.

## 8.3 Disposal

Products or parts thereof (mechanical and electrical components, operating fluids, etc.) may cause environmental burden.

➔ Safely dispose of the materials according to the locally applicable regulations.

# 9 Malfunctions

Malfunctions on the pumping station are usually caused by faults on individual components. Faults are indicated by the LEDs at the electronic drive unit of the tur-bopump. Alternatively, a fault code can also be output at the display and control unit DCU.

- Please refer to the relevant operating manual for information about troubleshooting individual pump components.
- If no display and control unit is available, please contact the Pfeiffer Vacuum Service.

## 9.1 Rectifying malfunctions

| Problem | Possible causes | Remedy |
|---|---|---|
| Pumping station will not start; none of the integrated LEDs on the electronic drive unit of the turbopump light up | • Electrical supply interrupted | ⇨ Check the plug contacts at the relay box and the power supply unit.<br>⇨ Check the supply lines of the pumping station.<br>⇨ Check the output voltage (24 VDC) at the "DC out" terminal of the power supply unit<br>⇨ Check the plug contacts on the power supply unit |
| | • Incorrect operating voltage | ⇨ Apply correct operating voltage<br>⇨ Observe the ratings on the type plate. |
| | • No operating voltage applied | ⇨ Apply the correct operating voltage. |
| | • Electronic drive unit defective | ⇨ Replace the electronic drive unit.<br>⇨ Contact Pfeiffer Vacuum Service. |
| Pump not achieving the required final pressure | • Condensate in the backing pump | ⇨ Open the gas ballast valve at the backing pump. |
| | • Gas ballast valve open | ⇨ Close the gas ballast valve at the backing pump. |

# 10 Service

**Pfeiffer Vacuum offers first-class service!**

- Operating fluid and bearing change on the spot by Pfeiffer Vacuum FieldService
- Maintenance / repair in the nearby ServiceCenter or ServicePoint
- Fast replacement with exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information, addresses and forms at: **www.pfeiffer-vacuum.com (Service**).

**Maintenance and repair in the Pfeiffer Vacuum ServiceCenter**

The following steps are necessary to ensure a fast, smooth servicing process:

➔ Download the forms "Service Request" and "Declaration on Contamination".[1)]
➔ Fill out the "Service Request" form and send it by fax or e-mail to your
➔ Pfeiffer Vacuum service address.
➔ Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
➔ Fill out the declaration on contamination and include it in the shipment (required!).
➔ Dismantle all accessories.
➔ Drain the operating fluid (applies for turbopumps with pumping speed > 700 l/s).
➔ Leave electronic drive on the pump.
➔ Close the flange openings by using the original protective covers.
➔ If possible, send pump or unit in the original packaging.

**Sending of contaminated pumps or devices**

No units will be accepted if they are contaminated with micro-biological, explosive or radioactive substances. “Hazardous substances” are substances and compounds in accordance with the hazardous goods directive (current version). If pumps are contaminated or the declaration on contamination is missing, Pfeiffer Vacuum performs decontamination at the shipper's expense.

➔ Neutralise the pump by flushing it with nitrogen or dry air.
➔ Close all openings airtight.
➔ Seal the pump or unit in suitable protective film.
➔ Return the pump/unit only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

**Exchange unit**

The factory operating parameters are always preset with exchange units. If you use changed parameters for your application, you have to set these again.

**Service orders**

All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

1) Forms under www.pfeiffer-vacuum.com

# 11 Spare parts HiCube 80 Eco

Please also specify model number of the the rating plate when ordering accessories or spare parts.

Refer to the operating manuals for the individual components.

# 12 Technical data and dimensions

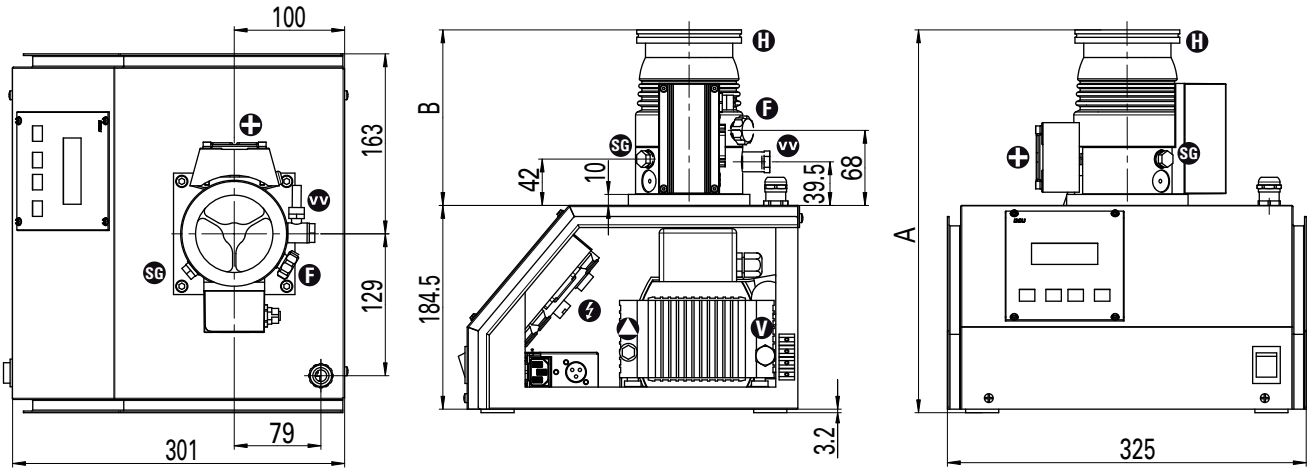
## 12.1 General

Basic principles for the Technical Data of Pfeiffer Vacuum Turbopumps:

- Recommendations of PNEUROP committee PN5
- ISO 21360; 2007: "Vacuum technology - Standard methods for measuring vacuum-pump performance - General description"
- ISO 5302; 2003: "Vacuum technology - Turbomolecular pumps - Measurement of performance characteristics"
- Ultimate pressure: using a test dome and a 48 hrs. period of baking out
- Gas throughput: water cooling; backing pump = rotary vane pump (10 $m^3/h$)
- Cooling water consumption: at max. gas throughput, cooling water temp. 25 °C
- Integral leack rate: using a Helium concentration of 100 %, period 10 s
- Sound pressure level: Distance 1 m to the pump

## 12.2 Technical data

| Parameter | HiCube 80 Eco | HiCube 80 Eco | HiCube 80 Eco |
|---|---|---|---|
| Flange (in) | DN 63 ISO-K | DN 63 CF-F | DN 40 ISO-KF |
| Pumping speed for $N_2$ | 67 l/s | 67 l/s | 35 l/s |
| Pumping speed backing pump at 50 Hz | 0.9 $m^3/h$ | 0.9 $m^3/h$ | 0.9 $m^3/h$ |
| Ultimate pressure | < 1 · $10^{-7}$ mbar | < 1 · $10^{-7}$ mbar | < 1 · $10^{-7}$ mbar |
| Mains requirement | 110 V, 50/60 Hz ; 230 V, 50/60 Hz | 110 V, 50/60 Hz ; 230 V, 50/60 Hz | 110 V, 50/60 Hz ; 230 V, 50/60 Hz |
| Mains requirement: power consumption | 230 V AC | 230 V AC | 230 V AC |
| Weight | 17 kg | 17 kg | 17 kg |




| Dimensions | HiCube 80 Eco | HiCube 80 Eco | HiCube 80 Eco |
|---|---|---|---|
| Flange (in) | DN 63 ISO-K | DN 63 CF-F | DN 40 ISO-KF |
| A | 347 mm | 349.5 mm | 352.5 mm |
| B | 159 mm | 165 mm | 168 mm |

# Declaration of conformity

according to the EC directive:

- **Machinery 2006/42/EC (Annex II, no. 1 A)**

We hereby declare that the product cited below satisfies all relevant provisions of EC directive "Machinery" **2006/42/EC**.

In addition, the product cited below satisfies all relevant provisions of EC directive "Electromagnetic Compatibility" **2004/108/EC** .

The agent responsible for compiling the technical documentation is Mr. Jörg Stanzel, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Aßlar.

**HiCube**

**HiCube 80 Eco**

Guidelines, harmonised standards and national standards and specifications which have been applied:

| | |
|---|---|
| DIN EN ISO 12100-1 : 2004 | DIN EN 61000-3-2 : 2008 |
| DIN EN ISO 12100-2 : 2004 | DIN EN 61000-3-3 : 2006 |
| DIN EN ISO 14121-1 : 2007 | DIN EN 61010-1 : 2002 |
| DIN EN 1012-2 : 1996 | DIN EN 61326-1 : 2006 |
| DIN EN 61010-1 : 2002 | DIN EN 62061 : 2005 |
| | Semi F47-0200 |

Signatures:

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(M.Bender)
Managing Director

(Dr. M. Wiemer)
Managing Director

CE/2010

PFEIFFER VACUUM

A PASSION FOR PERFECTION

PFEIFFER VACUUM

**Leading. Dependable. Customer Friendly**

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide. For German engineering art, competent advice and reliable services.

Ever since the invention of the turbopump, we´ve been setting standards in our industry. And this claim to leadership will continue to drive us in the future.

**You are looking for a perfect vacuum solution? Please contact us:**


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